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Towards predictive models for transitionally rough surfaces[1]
NABIL ABDERRAHAMAN-ELENA, RICARDO GARCIA-MAYORAL, Engineering Department, University of Cambridge — We analyze and model the previously presented decomposition for flow variables in DNS of turbulence over transitionally rough surfaces. The flow is decomposed into two contributions: one produced by the overlying turbulence, which has no footprint of the surface texture, and one induced by the roughness, which is essentially the time-averaged flow around the surface obstacles, but modulated in amplitude by the first component. The roughness-induced component closely resembles the laminar steady flow around the roughness elements at the same non-dimensional roughness size. For small –yet transitionally rough– textures, the roughness-free component is essentially the same as over a smooth wall. Based on these findings, we propose predictive models for the onset of the transitionally rough regime.

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